

Manage project spares efficiently with these best practices

Managing project spares is a very challenging task—one that is very different from managing a large warehouse. A company might be managing its material warehouse efficiently, yet fail miserably at handling project spares.

While setting up a new grassroots project or an expansion project, companies will be ordering thousands of spare parts comprising capital, commissioning and two-year operational spares (TYOSP), in addition to project materials such as capital equipment, pipes and fittings, cables, structural support, light fixtures, etc. To manage all project materials, project stores are maintained at construction sites by engineering, procurement and construction (EPC) contractors, while capital spares and TYOSP that are ordered with the project (but not required by the project) are shifted to a company's existing operation and maintenance/engineering stores (main stores).

During the peak phase of construction and erection, hundreds of crates, boxes and packages of project materials and project spares arrive in quick succession. Each company's project stores and main stores should be prepared to efficiently handle this huge influx of project materials and spare parts—if they are not, spares needed during commissioning and start-up may be difficult to locate and commissioning can be delayed. Furthermore, after the project is completed, companies can be saddled with huge project surplus and unidentified project spares. The saying, "There is nothing spare about spare parts," stresses that proper spare parts handling is not optional, but rather a requirement for a successful project.

Grassroots vs. expansion projects. If a grassroots project is in a new lo-

cation, the complexity is increased in contrast to an expansion project at an existing location. The latter will have a full-fledged, operational warehouse with trained staff; a fully functional enterprise resource planning (ERP) to manage materials; ISO work instructions and procedures; and warehouses to unload and stock consignments and warehouse equipment such as forklifts, pallet stackers, overhead cranes, etc. In contrast, for a grassroots project, everything is started from scratch and the timing of constructing the new warehouse to be operational

should be perfectly synchronized with the arrival of project spares onsite. This includes warehouse construction, warehouse staff recruitment, ERP go-live with all material master data uploaded in the ERP, etc.

The yardstick of measuring effective project spare part handling is that, by the end of the construction phase, all project spares (capital, commissioning and TYOSP) are received, inspected and binned in their designated location, and project spare stocks inventories are visible in the ERP system. There should be

TABLE 1. Checklist for effective project spares handling

1	Signed-off spare parts procedure manual is available at the start of the project.	<input type="checkbox"/>
2	A dedicated spare parts coordinator is appointed by the company to handle project spares.	<input type="checkbox"/>
3	Company has created sufficient open laydown area and covered warehouse shelves for receiving all the project spare parts.	<input type="checkbox"/>
4	Company has a fully implemented ERP system, and all employees are familiar with the ERP.	<input type="checkbox"/>
5	All project spares ordered are available in the ERP material master before the project spares arrive onsite.	<input type="checkbox"/>
6	All project spares are received before the project is commissioned.	<input type="checkbox"/>
7	All project spares received and inspected are available with quantities in the ERP.	<input type="checkbox"/>
8	Project equipment master with BOM is uploaded in the ERP prior to project commissioning.	<input type="checkbox"/>
9	Commissioning spares are available for use through steady-state warehouse.	<input type="checkbox"/>
10	All TYOSP are properly binned, preserved and catalogued in the ERP.	<input type="checkbox"/>
11	Replacements against damaged, non-conforming, or short-supply spares are received before commissioning of plant.	<input type="checkbox"/>
12	Project surplus spares are properly identified and taken to stock against respective SKUs.	<input type="checkbox"/>
13	Project spares do not create multiple SKUs for identical spares, generic materials.	<input type="checkbox"/>
14	Project spares material master is complete with all required material specifications (equipment tag, name, model number, equipment serial number, base order number, item long description, unit of measure, original manufacturer name, component supplier name, manufacturing part number, etc.) and for generic items, item description, size, rating, end connections, material grade, etc.	<input type="checkbox"/>
15	Project SPIRs are properly maintained according to vendor.	<input type="checkbox"/>
16	The project spares ordering was within the allotted budget.	<input type="checkbox"/>

no unidentified spare parts or untagged/binned project surplus (**TABLE 1**).

How can these deliverables be met? Best practices that have evolved out of lessons learned in the management of project spares are prescribed here. These best practices will assist in the smooth startup of a new facility. While this article is mainly written with TYOSP (handled by main stores) in mind, these principles can be applied for construction materials and equipment handled by project spares.

BEST PRACTICES

Spare parts procedure document.

Project spare parts management begins with an approved spare parts management procedure document. Three main parties are involved: the EPC contractor, the site project team and the steady-state company warehouse staff that will be taking over the project spares from the project team. Usually, the EPC contractor or technology licensor is responsible for get-

ting spare parts recommendations from the original equipment manufacturer (OEM). The roles, duties and responsibilities of the EPC contractor, site project team and site warehouse team are defined in the project spares management procedure. The procedure specifies:

- Who receives the spares list from the vendor
- Who reviews and recommends the spares to be ordered
- How the spares will be packed, preserved and labeled by the vendor
- Which team receives and inspects the spares onsite
- When and how the vendor is paid for spare parts supply
- The document numbering system, the correspondence numbering system, etc.

This is the foundation of the project spares management and should be properly discussed among the parties and signed off.

Project spares budget. Companies should, in consultation with the EPC contractor, fix the budget for project spares and monitor the commitments and amount spent vs. the budget on a regular basis. Management information system (MIS) reports of the budgeted amount, the committed amount [purchase order (PO) placed but payments not due], the amount paid, the balance amount available, etc., should be issued on a fortnightly basis. Usually, the cost of capital spares is included in the project cost and, therefore, is not part of the project spares budget. **FIG. 1** shows a real-time dashboard of a high-level project spares MIS.

Spare parts coordinator. The project site team should have a spare parts coordinator (SPC) that is a qualified material and engineering specialist from the company and is familiar with the company's ERP and stock numbering logic, as well as the project scope. This key role is the single point of contact (SPOC) for the entire project spare parts management. **TABLE 2** details the responsibilities of a spare parts coordinator. Several organizations executing mega-projects do not deploy a dedicated SPC and later realize their mistake. A full-time SPC is required, particularly for grassroots projects.

Equipment list. An equipment list for each major aspect of the project is also

TABLE 2. Responsibilities of the spare parts coordinator (SPC)

1	Single point of contact between the site project team, the EPC and steady-state stores.
2	Participates in finalization of project spares procedure.
3	Receives filled-in SPIR from the EPC contractor, checks for completeness of information, and finalizes the spare parts ordering recommendation in consultation with respective lead engineers.
4	Transmits final recommendation to the EPC contractor for ordering of spare parts from the equipment vendor.
5	Ensures that the recommended spare parts are ordered by the EPC contractor and updates tracking files.
6	Assigns stock numbers for each stock-keeping unit recommended for the order.
7	Gets project spares item master mass uploaded in the ERP through IT.
8	Keeps track of all the spare parts receipts onsite and inspects all the spares with respect to the spare parts order.
9	Ensures that steady-state operations properly stores, labels and stocks the spare parts.
10	Approves the payment to vendors against the spare parts delivered and accepted.
11	Prepares weekly MIS about project spare parts status and budget vs. expenditure status. Ensures that spare parts ordering is within approved budget.
12	Ensures proper documentation of base orders, spare parts order, correspondences, packing lists, SPIRs and stores receipt vouchers.

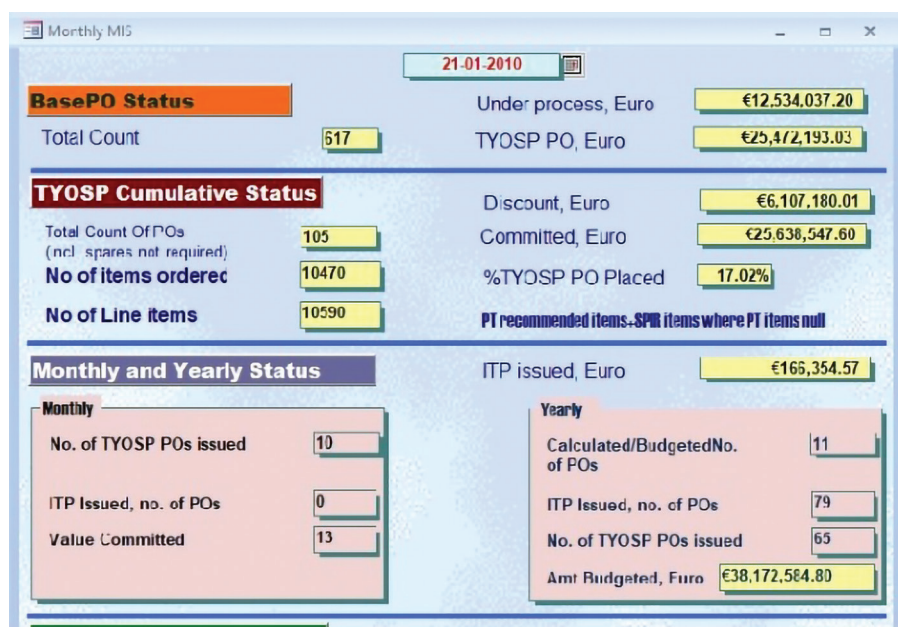


FIG. 1. Real-time project spare parts MIS dashboard.

one of the basic documents for project spares management. It is vital to know the total scope of the project spares ordering process, including tracking. The equipment list specifies the equipment tags, in turn helping assign stock numbers to various spare parts. A control valve tag list should also be included, along with any special valves (e.g., motorized valves) to be incorporated in the equipment list.

Base orders and spare parts orders.

Two types of orders are issued by the EPC contractor on the company's behalf:

- Base orders (BO): Capital equipment and all material required for project execution (structural, cable trays, lighting, pipes and fittings, cement, equipment, instruments, etc.)
- Spare parts order (SPO): capital spares, commissioning and TYOSP. The spare parts orders are released at a much later date, after the manufacturer has completed the design of the equipment and ordered auxiliaries from sub-vendors.

The SPC, in consultation with the project team and lead engineers, identifies which base orders/equipment and piping systems would require SPOs, as well. For instance, BOs for structural materials may not require an SPO order, but a BO for a compressor may require TYOSP to be ordered. The selected list of BOs will form the scope of project spares ordering. The EPC contractor sends the request to the respective vendors to provide their recommended spare part with rates for two-year operation in spare parts interchangeability record (SPIR) format (FIG. 2), along with all drawings and documents.

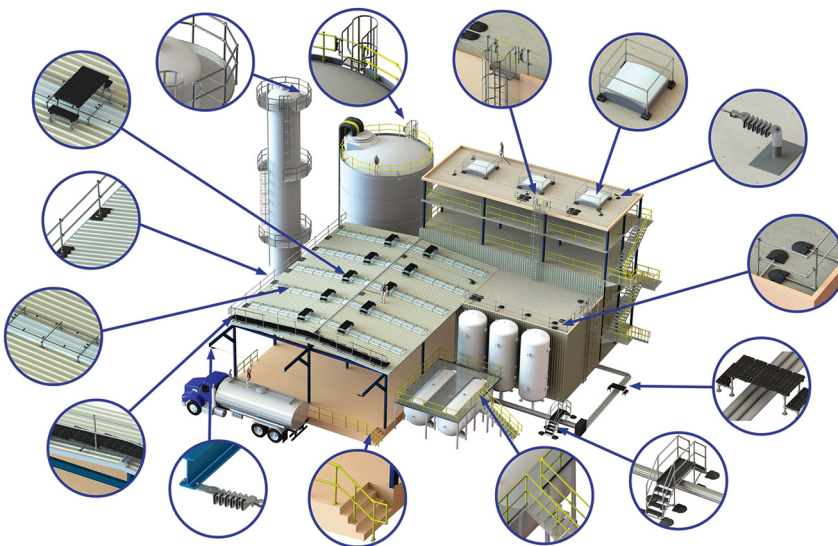
SPIR format. Vendors should be asked to quote in the SPIR format only. A vendor may have one or more BOs, depending on the number of equipment in its scope. For each vendor, all spares should be included in one SPIR, clearly showing the interchangeability of spares across various pieces of equipment and the total installed quantity of spare parts. The EPC contractor should ensure that the vendor fills all the required details in the SPIR, such as vendor part number; supplier part number; the quantities required for each spare part per equipment; the

total number of the installed spare part; the unit price and currency of the spare part; the size, dimension and make of generic items; the make, model and serial number of equipment to which the spare part belongs; the vendor-recommended quantities for commissioning; TYOSP; and lead time for each spare part.

Correspondence management. During the project stage, a regular exchange

of correspondence about project spares should occur between the EPC contractor and the site project group. A structured numbering process should be in place for all correspondence and status monitoring of the correspondence by the SPC.

Spare parts recommendations. After scrutinizing the completeness of the SPIR received from the vendor, the EPC contractor adds its recommendations for



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the ERP for tracking and receiving them into stock when they arrive.

Seaworthy packing. The spare parts procedure outlines the required method of packing, preservatives to be applied and the number of copies of the packing list. Typically, capital spares (e.g., rotors) should be packed in metallic containers filled with positive nitrogen pressure. The spare parts should be packed in seaworthy packing, properly sealed from the inside and suitable for outdoor, open storage. The various spare parts should be packed separately and labeled as per accepted norms. All boxes should have an individual packing list, and a copy of the packing list and approved SPIR sheet should be kept inside the box, as well. Packing requirement details are shown in **TABLE 3**.

Avoid double handling. Project spares and equipment may be shipped together or separately. However, spare parts packets/boxes are packed separately and not mixed with equipment crates or boxes. Spare parts boxes are directly unloaded to the steady-state company warehouse (main stores) and not stocked at the project warehouse. This avoids double handling and mixing project materials with operational spares. The project warehouse handles consignments that are directly required for the project execution (equipment, piping, cables, etc.).

Consignment tracking. The SPC must track received consignments by box number, weight, packing list number, base PO number, spare parts PO number, vendor number, etc. A simple spreadsheet may suffice for proper tracking of spare parts, but a more in-depth database program is very useful (**FIG. 3**).

Capital spares management. Although ordered with the equipment, capital spares should be unloaded directly in a steady-state warehouse—rather than in project stores—for proper inspection and preservation.

Spare parts inspection. Consignment boxes should be kept in a closed warehouse and remain unopened until inspection. The vendor should tag each item with company stock number, order number, order line item number, vendor part number, etc., so that items can be easily identified,

TABLE 3. Packing tips for TYOSP

1	Packing list must strictly conform with the packing content, and the vendor will be responsible for the accuracy of the weights, quantity and dimensions declared.
2	Packing cases and other shipping containers must be capable of giving adequate protection to contents for a period of 1 yr after dispatch from the vendor workshop.
3	TYOSP must be protected and packed in such a manner as to ensure a minimum shelf life of 4 yr in an un-airconditioned warehouse sited in an extremely dusty, heavily industrial and coastal area with salt pollution, where the maximum shade temperature may vary from 10°C–45°C and where relative humidity reaches 85%.
4	Consumable items, such as bolts and nuts, must be adequately oiled to prevent corrosion.
5	Electronic and instrument parts should be packed in sealed, clear plastic bags along with a bagged amount of desiccant.
6	Special storage items are to be clearly labeled with storage instruction such as: "1) Store in a cool, dry place at XX°C, to be stored under cover, keep humidity below XX%." The label should be clearly marked outside the shipment, so it can be taken directly with special care.
7	Any protection of stainless-steel parts should not contain chlorides or harmful metal salts such as zinc, lead, copper, etc. Also, marking paint or ink shall not contain similar harmful components.

inspected and binned. The SPC is responsible for inspecting the project spares and authorizing stores for binning, if needed.

Retain vendor tag. Even if a company has a policy of placing its labels on all items, vendor tags should never be removed, as they help in proper part identification.

Original packing. After inspection, spare parts should be packed back in their original packing to prevent damage and deterioration, especially items such as journal and thrust bearings, etc.

Binning. When the SPC is ready to inspect the spare parts, the spare parts boxes should be opened one at a time so that all parts can be identified, tallied with the spare part PO for quantities, labeled properly and accepted for binning.

If the steady-state warehouse is not prepared for binning, the inspected spares are again packed in the same box and segregated from the uninspected boxes. After inspection, the spare parts should be stored as per the recommended storage code and location updated in the ERP.

Status change. Once all the items of a given spare parts PO are inspected and accepted, payment to the vendor is processed by the company SPC. Necessary changes in the tracking sheet are completed, and the status of the PO is updated as "received."

Project surplus. At the end of the project, it is not uncommon to have surplus

construction material, such as cables, fasteners, pipe and pipe fittings, gaskets, etc. Often, the project team dumps everything in the operational warehouse without proper labelling and packing lists. Operational stores should insist on proper labeling with company stock numbers and packing surplus material before they accept anything into their custody. If stock numbers do not exist for some project surplus, the same is to be created before transferring the surplus to the operational warehouse.

Simultaneous go-live of the PM module. The plant maintenance (PM) module of the ERP should also simultaneously go live so that the project equipment master, equipment bill of material (BOM), etc., can be uploaded with the material master. **HP**

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